

## A NEW SPECIES OF *UROLEUCON* (*UROLEUCON*) AND COMMENTS ON *UROLEUCON* (*UROLEUCON*) *TUCUMANI* (ESSIG) (HOMOPTERA: APHIDIDAE)<sup>1</sup>

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*Abstract.*—*Uroleucon* (*Uroleucon*) *garnicai* NEW SPECIES on *Eupatorium buniifolium* Hooker & Arnold from Argentina is described. Morphological and biological aspects were analyzed together with those of its closely related species *Uroleucon* (*Uroleucon*) *tucumani* (Essig). The study of the type specimens of *U. tucumani* shows that they could belong to two different species; those collected in Tucumán are true *U. tucumani*.

*Key Words.*—Insecta, *Uroleucon garnicai*, *Uroleucon tucumani*, Aphididae, morphometrics, discriminant analysis

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*Uroleucon* live on plants in the Asteraceae (= Compositae), and are broadly distributed throughout the world with some almost cosmopolitan species. Smith & Cermeli (1979) list 23 species in the Neotropical region, seven of which were described from Argentina. Of these, *Uroleucon* (*Uroleucon*) *tucumani* (Essig) was described by Essig (1953) as a *Macrosiphum* from specimens collected on *Baccharis* sp. in Huanta (Guanta), Chile and on *Baccharis* sp. (?) in Tucumán province, Argentina by Michelbacher.

All the aphids collected on *Baccharis coridifolia* De Candolle in Córdoba province, Argentina, as well as those collected on *Eupatorium buniifolium* Hooker & Arnold in Córdoba and Tucumán provinces, had been previously considered to be *U. tucumani*. Essig's description is very brief and generalized, making it impossible to recognize accurately this, and related, species.

To solve this problem, a detailed study of the *Uroleucon* collected on *B. coridifolia* and *E. buniifolium* was undertaken, and showed two species exist with one described as new here.

### MATERIALS AND METHODS

Aphids belonging to the genus *Uroleucon* were collected on *E. buniifolium* and *B. coridifolia* in Tafi del Valle (Tucumán, Argentina) and Cabana (Córdoba, Argentina). Adult aphids were mounted on slides in Hoyer's mountant. Nineteen body structures (Table 1) were measured from 60 apterae (30 of each host plant). The data were analyzed on a VAX-11 computer using the discriminant analysis program in the BMDP statistical package, at the University of California.

During comparative studies, the types of *U. tucumani* (Essig) were analyzed. Their data follow: "Type," ARGENTINA. TUCUMÁN: 11 Feb 1951, Michelbacher, *Baccharis* sp.?, 1 alate viviparous female. Paratypes: same data as type, 4 apterous viviparous females; CHILE. HUATA (GUANTA): 4 Dec 1950, Michelbacher, *Baccharis* sp., 4 apterous viviparous females, 3 alate viviparous females.

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Table 1. Morphometric data for *U. garnicai* and *U. tucumani*. All measurements are in mm as range, followed by the mean in parentheses.

Character	<i>U. garnicai</i>	<i>U. tucumani</i>
Body length	1.92–2.67 (2.30)	1.86–2.59 (2.14)
Metatibia length	1.30–1.68 (1.51)	1.13–1.70 (1.41)
Metafemor length	0.75–0.85 (0.82)	0.65–0.93 (0.77)
Siphunculus length	0.49–0.62 (0.55)	0.44–0.60 (0.54)
Cauda length	0.31–0.38 (0.34)	0.24–0.31 (0.13)
Decimal proportion of reticulated part of the siphunculus	0.21–0.27 (0.24)	0.20–0.29 (0.24)
Length of ant. seg. III	0.55–0.73 (0.64)	0.51–0.68 (0.61)
Length of ant. seg. IV	0.50–0.62 (0.58)	0.33–0.53 (0.45)
Length of ant. seg. V	0.44–0.59 (0.50)	0.30–0.44 (0.40)
Length of base of ant. seg. VI	0.14–0.18 (0.17)	0.12–0.17 (0.14)
Length of processus terminalis	0.71–0.87 (0.80)	0.54–0.76 (0.67)
Length of ultimate rostral segment	0.13–0.15 (0.14)	0.13–0.15 (0.14)
Length of hind distitarsus	0.14–0.17 (0.16)	0.12–0.14 (0.13)
Diameter of ant. seg. III	0.032–0.035 (0.034)	0.030–0.037 (0.033)
Length of setae on ant. seg. III	0.030–0.040 (0.034)	0.017–0.027 (0.023)
Number of sensoria on ant. seg. III	4–13 (9)	7–15 (11)
Number of rostral setae	6–10 (8)	7–13 (9)
Number of caudal setae	9–12 (11)	8–11 (10)

#### *UROLEUCON (UROLEUCON) GARNICAI* DELFINO, NEW SPECIES

*Types.*—Holotype: apterous viviparous female; data: ARGENTINA. *CÓRDOBA PROVINCE*: Cabana, 27 Jan 1988, M. A. Delfino, *Eupatorium buniifolium*; deposited: Instituto Miguel Lillo, Tucumán. Paratypes: same data as holotype, 3 apterous viviparous females, 2 alate viviparous females; same data as holotype except 28 Jan 1985, 17 apterous viviparous females. ARGENTINA. *TUCUMÁN PROVINCE*: Tafi del Valle, 2 Mar 1985, M. A. Delfino, *Eupatorium buniifolium*, 9 apterous viviparous females. All paratypes deposited: British Museum (Natural History), London.

*Apterous Viviparous Female.*—( $n = 30$ ) *Color*: Living specimens with entire body brown. Cleared specimens with dorsum colorless, bearing distinct separate brown sclerites; weakly sclerotized specimens with the sclerites poorly defined; head, antennal segments I, II and base of III brown; antennae flagellum, rostrum, distal halves of the femora, distal fourth part of the tibiae, tarsi and siphunculi dark brown to nearly black; cauda pale to slightly smoky. *Morphological characters*: Body length 1.92–2.67 mm (Fig. 1A). Head smooth with antennal tubercles well developed, diverging; median frontal tubercle inconspicuous (Fig. 1E). Antennae with processus terminalis 4.28–5.31 × the base of segment VI; flagellum almost smooth in the basal one-half of segment III and imbricate distally. Antennae hairs on segment III 0.030–0.040 mm long, about 0.86–1.14 × as long as the basal diameter of segment. Secondary rhinaria 6–13, distributed on nearly the whole length of antennal segment III (Fig. 1B). Rostrum reaching the hind coxae; ultimate rostral segment 0.13–0.15 mm; 0.81–1.00 × as long as the hind distitarsus (Fig. 1H), with 7–10 additional hairs. Hind tibiae and femur 0.56–0.76 and 0.31–0.40 × body length, respectively. First tarsal chaetotaxy usually 5:5:5. Dorsal hairs of abdomen on small sclerites (Fig. 1D); tergite VIII with 4 hairs. Postsiphuncular sclerites distinct, sometimes very small; antesiphuncular sclerites not developed. Frequently small marginal tubercles, irregularly present on segments II–IV. Siphuncular length 0.22–0.27 × body length (Fig. 1G), distinctly shorter than antennal segment III, reticulated on distal 0.21–0.29, remainder imbricate. Cauda with distal two-thirds rather slender, acuminate, bearing 9–12 hairs; about 0.56–0.68 × as long as the siphuncular length. Genital plate with 2–4 (usually 2) hairs on anterior half and 8–12 hairs on the hind margin. *Measurements*: See Table 1.



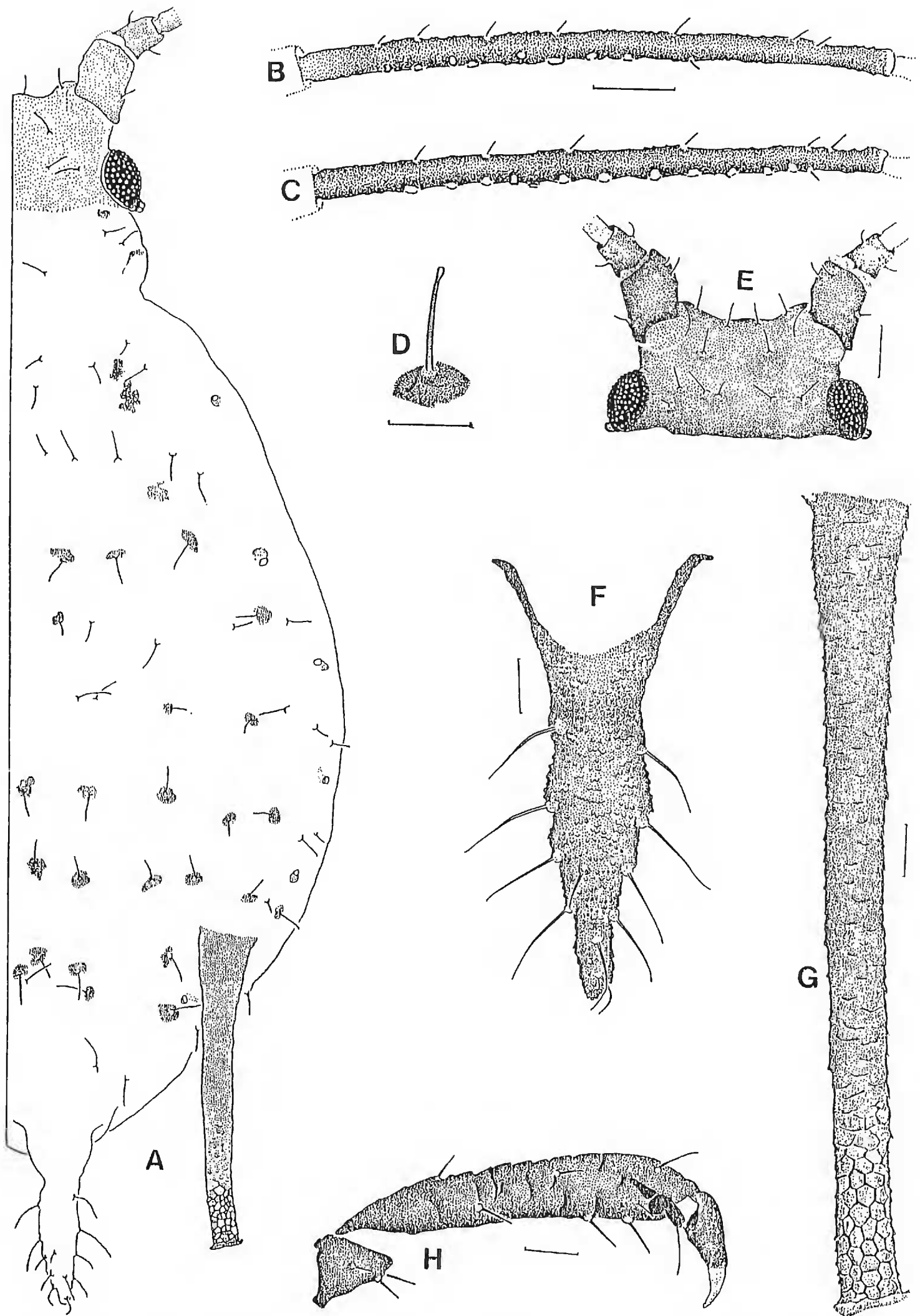


Figure 1. *Uroleucon garnicai*, NEW SPECIES. A. Body dorsum, right half (aptera). B. Secondary rhinaria on antennal segment III (aptera), scale bar = 98  $\mu$ . C. Secondary rhinaria on antennal segment III (alate). D. Dorsal hair on abdomen with sclerite base (aptera), scale bar = 24  $\mu$ . E. Frontal area of head showing median frontal tubercle (aptera), scale bar = 98  $\mu$ . F. Cauda (alate), scale bar = 40  $\mu$ . G. Siphunculus (aptera), scale bar = 40  $\mu$ . H. Hind distitarsus (aptera), scale bar = 24  $\mu$ .

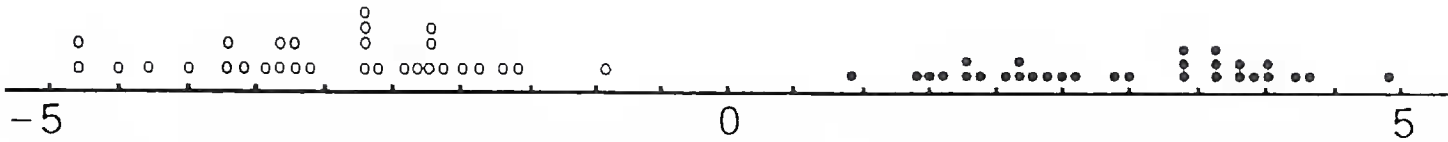


Figure 2. Standardized discriminant function showing canonical variable distributions for *U. tucumani* and *U. garnicai*. On this function, the unstandardized discriminant index,  $L_o$ , of 3.33 equals 0 on this standardized function. Black = *U. garnicai*, white = *U. tucumani*.

*Alate Viviparous Female.*—( $n = 2$ ) *Color:* Living specimens with head, antennae, thorax and legs dark brown, abdomen brown. Cleared specimens with head and thorax brown; antennal segment I, II and base of III concolorous with the head, remainder dark brown; legs with basal one-half of femora pale, distal one-half dark brown; tibiae dark brown except basally slightly pale; tarsi concolorous with apical tibiae; marginal sclerites small, on poorly pigmented specimens; siphunculi uniformly dark brown; cauda, genital, and anal plates dusky, or slightly darker than abdomen. *Morphological characters:* Body length 2.39–2.48 mm. Antennae with processus terminalis  $4.14\text{--}4.61\times$  the base of segment VI. Hairs of antennal segment III 0.030–0.032 mm long, about  $0.94\text{--}1.07\times$  the length of the basal diameter of segment. Secondary rhinaria on segment III about 8–14 in number covering almost its entire length (Fig. 1C). Ultimate rostral segment 0.14 mm;  $0.78\text{--}0.86\times$  the length of the hind distitarsus, with 7–8 additional hairs. Hind tibiae and femur 0.62–0.73 and  $0.32\text{--}0.37\times$  body length, respectively. Dorsal hairs of abdomen on small sclerites poorly pigmented. Siphunculi  $0.22\text{--}0.26\times$  body length, reticulated over apical 0.23–0.24, remainder imbricate. Cauda about  $0.53\text{--}0.60\times$  siphuncular length (Fig. 1F). Otherwise like apterous viviparous females.

*Diagnosis.*—Because *U. garnicai* overlaps morphologically with *U. tucumani*, a discriminant function must be calculated to separate these species reliably. See Table 2, the discussion for character overlap and the diagnostic function.

*Etymology.*—This species is named after Rafael Garnica, Universidad de Leon, Spain, who taught me so much on our field trips in that country.

*Material Examined.*—See types.

## DISCUSSION

*Morphology.*—The correlation matrices for both *U. garnicai* and *U. tucumani* show that the lengths of the metafemur, antennal segment III and cornicle (siphunculus) are highly correlated; therefore, I consider only one of these characters for the morphological analysis of the specimens. The use of discriminant analysis between the two species shows that the lengths of the cauda, antennal segment III, antennal segment IV, setae on antennal segment III and the base of antennal segment VI are five characters that could differentiate the two species.

Table 2. Differences between *U. garnicai* and *U. tucumani*. Measurements are in mm as range followed by the mean within parentheses.

Character	<i>U. garnicai</i>	<i>U. tucumani</i>
Color in life	brown	black
Cauda length	0.31–0.38 (0.34)	0.24–0.31 (0.28)
Processus terminalis length	0.71–0.87 (0.80)	0.54–0.76 (0.67)
Hind distitarsus length	0.14–0.17 (0.16)	0.12–0.14 (0.13)
Setae length of ant. seg. III	0.030–0.040 (0.034)	0.017–0.027 (0.023)
Host plant	<i>E. buniifolium</i>	<i>B. coridifolia</i>
Linear discriminant function ( $L_o$ 3.33) (see discussion section).	$L_g = 3.96$	$L_t = 2.69$
Ratio (see Fig. 3)	13.23–18.82	8.50–12.96

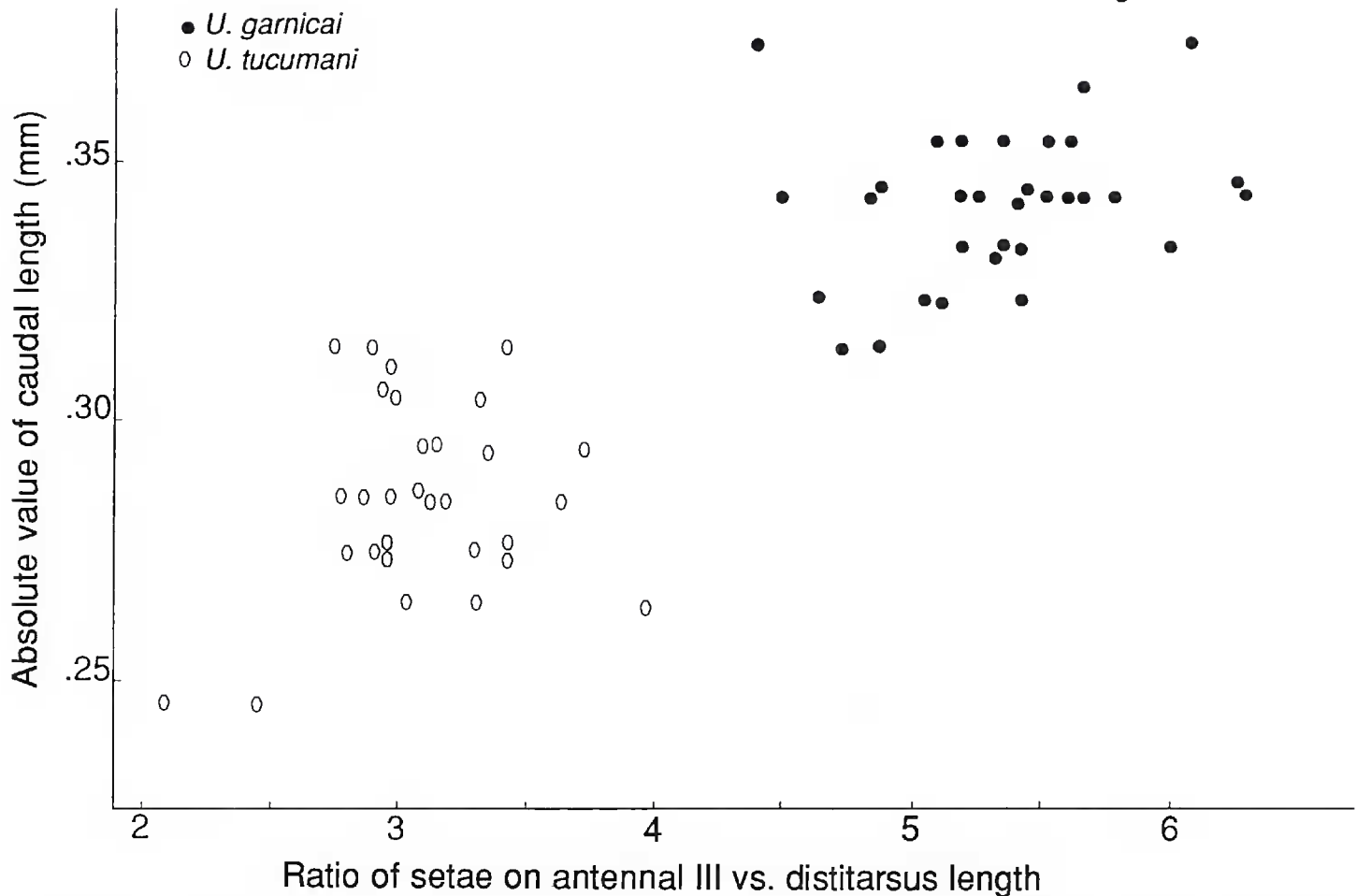


Figure 3. Regression of caudal length plotted against a ratio of the number of setae on antennal segment III versus distitarsal length. White = *U. tucumani*, black = *U. garnicai*.

A linear discriminant function ( $L$ ) distinguishes these species; for *U. garnicai*,  $L_g = 3.96$ ; for *U. tucumani*,  $L_t = 2.69$ ; with discriminant index ( $L_o$ ) of 3.33. Starting from these values specimens belonging to these species could be correctly classified according to the following function,  $L_i$ .

$$L_i = (7.4883 \times X_1) - (4.2548 \times X_2) + (1.8261 \times X_3) \\ + (7.9576 \times X_4) + (53.5169 \times X_5)$$

where:  $X_1$  = cauda length;  $X_2$  = length of antennal segment III;  $X_3$  = length of antennal segment IV;  $X_4$  = length of base of antennal segment VI;  $X_5$  = setae length of antennal segment III. (Lengths are in mm.) The specimens are *U. garnicai* if  $L_i > 3.33$ , as  $L_o$ , or are *U. tucumani* if  $L_i < 3.33$ .

The histogram of the canonical variates (Fig. 2) shows the separation between these two species. The setae length on antennal segment III  $\times$  length of hind distitarsus I also obtained values that discriminate these species; that value in *U. garnicai* ranges from 4.8–6.4 and in *U. tucumani* it is 2.0–3.9. The ratio: (ant. seg. III)  $\times$  (hind distitarsus)/(cauda length), is 13.23–18.82 for *U. garnicai* and 8.50–12.96 for *U. tucumani*. These values are plotted in Fig. 3.

The length of hind distitarsus (Table 1) also seems to be a useful character to separate these species univariately. However, three alatae and four apterae from Chile ("Paratype" of *U. tucumani*) have tarsal lengths of 0.16–0.18 mm, similar to *U. garnicai*; however, one alatae from Tucumán ("Type" of *U. tucumani*) and four apterae also from Tucumán ("Paratype" of *U. tucumani*) have tarsal lengths of 0.11–0.13 mm, as do the specimens that I collected on *B. coridifolia*. Because of this, although Essig's "Type" and "Paratype" from Tucumán are necessarily



“true” *U. tucumani*, as I collected on *B. coridifolia*, Essig’s “Paratype” from Chile could be another very closely related species.

Furthermore, the apterae from Chile have a few secondary rhinariae (2–6) on the antennal segment III and the processus terminalis is short in relation at the base of antennal segment VI. Curiously, Essig drew two antennal segments III of apterae and alatae when he described *U. tucumani*, one set with long setae and the other with shorter ones. He obviously observed some differences in his material that he did not explain in the description.

*Biology.* — *Uroleucon garnicai* colonizes the young shoots and stems of the inflorescences of *E. buniifolium*, a shrub widely distributed in Argentina. In Tafi del Valle (1972 m el) this species forms crowded colonies that often cover several stems; whereas, in Cabana (500–600 m el) it forms disperse and small groups of 1–3 adult aphids per group. This suggests that there could be different ecotypes which are more or less suitable to *U. garnicai*, according to the geographic distribution of *E. buniifolium*.

No sexuals of *U. garnicai* were found on this plant. Alate males were captured in Moericke traps placed in Tafi del Valle; morphologically these males are fairly similar to *U. garnicai* females. If the males are actually *U. garnicai*, considering the abundance on *E. buniifolium* there, the possible origin of *U. garnicai* could be in the highlands (e.g., Tafi del Valle) where its host plant is common. *Uroleucon garnicai* seems to be completely monophagous on this single host species year-round. It may be a holocyclical and monoecious species on *E. buniifolium*.

*Uroleucon tucumani* colonizes twigs and shoots on *B. coridifolia*, a shrub also widely distributed in Argentina. In Cabana, its colonies contain only a few adults, which fall readily when disturbed.

Both species are very closely related but are easily distinguished in nature by their body color and host plant; *U. garnicai* is brown and lives on *E. buniifolium*, whereas *U. tucumani* is black and lives on *B. coridifolia*.

*Conclusions.* — *Uroleucon (Uroleucon) garnicai* is a new species closely related to *Uroleucon (Uroleucon) tucumani* (Essig). Both may be distinguished by biological and morphological characters. The *U. tucumani* paratypes labelled by Essig with specimens collected in Argentina and Chile could belong to two different species. The specimens collected in Tucumán are the true *U. tucumani*.

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